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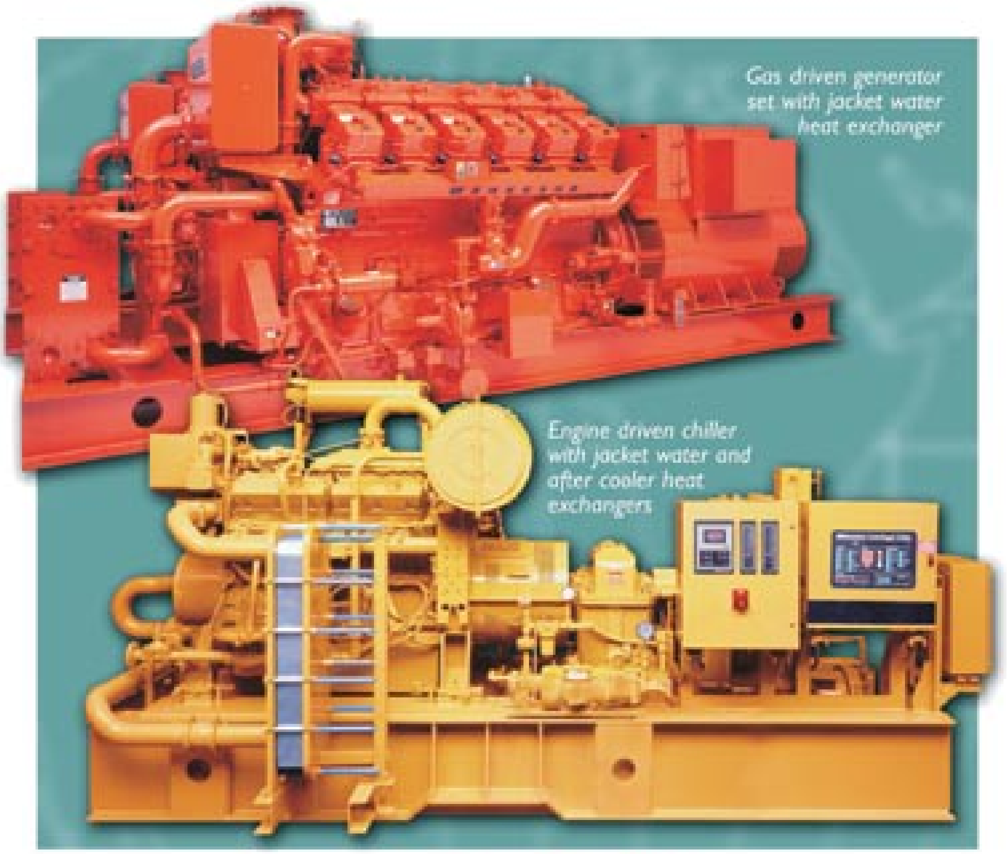

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On the Cover: The Alberta Children's Hospital provides a lesson in On-Site Power. Photo courtesy Alberta Children's Hospital, Calgary, Alberta, Canada; Page 28.

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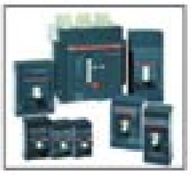

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EVENTS CALENDAR

Conferences

EGSA 2008 Annual Spring Convention
March 16-18, 2008; Santa Ana Pueblo, NM

The Association's Annual Convention of Members. Speakers will cover business and technical aspects of On-Site Power Generation and current industry trends. For additional information, visit *www.EGSA.org* or call (561) 750-5575.

EGSA 2008 Fall Technical & Marketing Conference
September 7-9, 2008; Atlanta, GA

Speakers will cover business and technical aspects of On-Site Power Generation and current industry trends. For information, visit *www.EGSA.org* or call (561) 750-5575.

EGSA 2009 Annual Spring Convention
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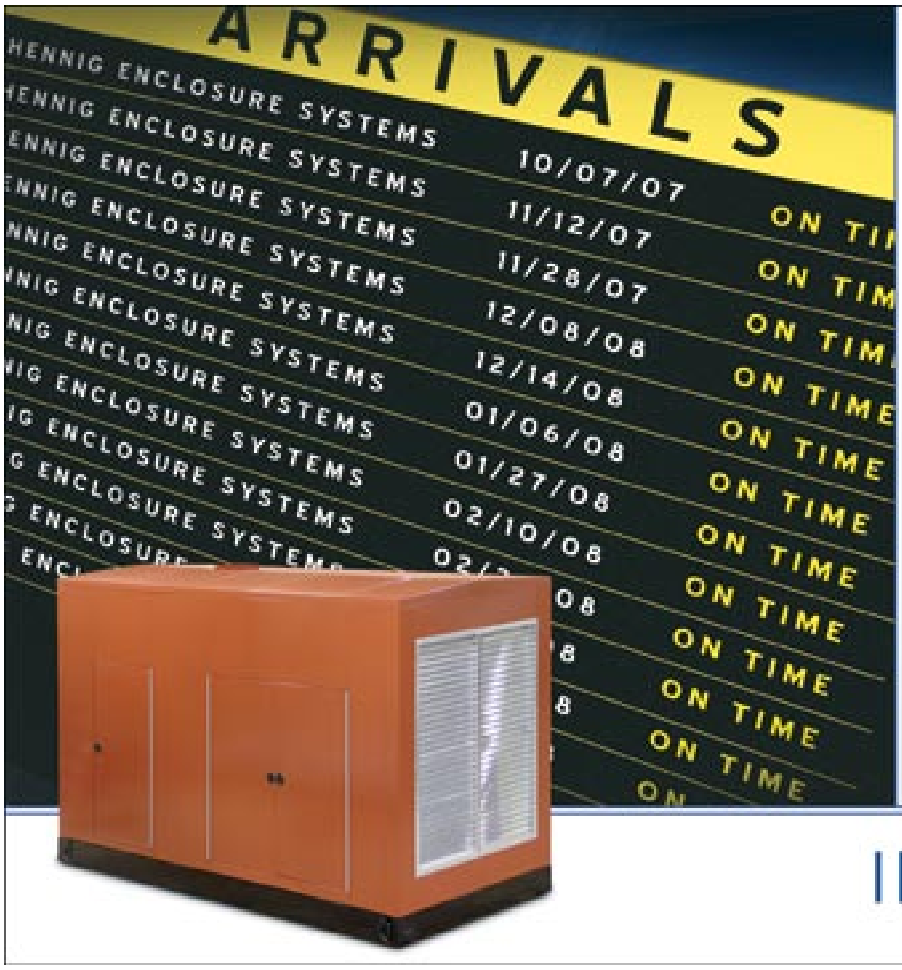
Look for more industry events in our up-to-date calendar on the web at *www.EGSA.org. EGSA Members*: To list your meetings here, fax your information to (561) 395-8557.



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Warner Bauer
2008 EGSA President

Plan Now for the Days Ahead

There's been a lot of discussion lately about the possibility of recession and the need to stimulate the economy in the face of a slowdown. This may be true for the larger economic picture, but I am happy to report that On-Site Power appears to be doing pretty well lately.

According to our friends over at Diesel Progress magazine, the larger engine industry (750 hp and above) and those segments of engines for standby, peaking and continuous power generation sets have been breaking records for the last two years. Diesel Progress reports that a plateau may have been reached this year, but levels are still incredibly high. So, even if there is a slight dip in the large engine marketplace for generator sets, it will still be a very robust market. Diesel Progress further reports that this market tends to be equally distributed between 50 and 60 Hz. That is, North America (60 Hz) remains strong, but most of the rest of the 50 Hz world–especially Brazil, Russia, India and China–continue to grow their power generation infrastructures as well.

In short, things are going pretty well right now, but we need to keep an eye on the future.

Most of our members and other firms throughout the On-Site Power industry are enjoying very prosperous times. Common sense, however, warns us that all good things come to an end. Business experts tell us that effective planning, however, can ease your company's transition into leaner times, maintain employee morale and maximize customer service.

These same business experts urge us to effectively manage our most valuable asset: our employees. Recruiting the right employees and providing them with adequate training are the keys to any firm's success. Make sure your employees understand how important they are to your success and keep them informed about their own success with regularly scheduled employee performance reviews. Focus on staffing and training to ensure that you continue to deliver superior customer service—regardless of the economic climate.

Don't settle for satisfied customers; insist on loyal customers. Loyal customers tend to stay with you regardless of the economic climate. They are open and honest with their feedback, and they refer business to you.

On-Site Power firms should develop particular strategies to ensure success during an economic downturn. These include finding ways to keep long product lead times from damaging customer relations, maintaining a balance between project engineering and product development, allowing sales departments the time to prospect and develop customer relations, and focusing on quality control to ensure that costly mistakes do not occur—thus maintaining your firm's profitability and your customer relations.

Yes, things do look good right now but we all know that economic downturns are inevitable. Prepare yourself for them by reviewing the lessons you've learned from past experiences, and you can be confident of your success. ■

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George Rowley
EGSA Director
of Education

New Schools Format A Success

Congratulations are in order for all those involved in redesigning our On-Site Power School curriculum and especially to the instructors who re-designed their individual modules and PowerPoint presentations. After several years' preparation, the Basic School portion of our new two-tiered school debuted in Mesa, AZ in February (the Advanced School will debut in Brunswick, NJ in April).

While we need to make a few "tweaks" here and there, written feedback from students in attendance was very positive and the ratings were higher than usual; students also provided an abundance of written comments and suggestions that will be very beneficial as we make adjustments. Verbal comments from students at the school were very positive about the concept and our success at implementing it.

The basic school is aimed at meeting the needs of people with non-technical backgrounds and those that are new to the industry and it seems that most of those in attendance followed our guidelines as to who should attend. A total of 41 students attended and the average amount of experience for those turning in evaluation forms was 3 years. 27 of the attendees were sales and marketing personnel or managers. Of the 10 engineering or service personnel in attendance, all but 3 had less than 6 years experience. For details on the Schools, please visit our web site at *www.EGSA.org*.

The New Edition of Our Reference Book

Preparation for publication of the new edition of the reference book continues. The Section and Chapter sequence and overall content was approved by the Book Editorial Committee and the Education Committee at the Fall Convention. Those Committees will meet in joint session at the Spring convention to make final decisions about Author Guidelines and the Author Selection Guidelines and process.

As recently reported, the committee plans updates to every chapter as well as a number of significant improvements to the new edition. The sequence of Sections and Chapters within the book will change, several new chapters will be added, several chapters have been combined, and many chapters will be reconstituted through the addition of new topics. We also plan to have the index compiled by a professional indexing service and will determine if color graphics and illustrations are economically feasible.

Complete realization of the Book Editorial Committee's plan for the book is contingent upon identifying and recruiting qualified authors to write the chapters. We will depend on you to help us identify authors that possess the expertise and experience to make the new edition exceptional. Please watch for a "Call for Authors" (and Reviewers) to be broadcast in the not-too-distant future.

Technician Cerftification Program Update

150+ Certified Techs! The Certification Program is gaining traction, and interest and momentum is increasing. Because this article is written weeks in advance of its publication, we can only make an educated guess, but we anticipate reaching a milestone of 150 Certified Technicians in February or March. As of the end of January, 142 technicians had taken and passed the Certification test (11 Certified Techs reside outside of the United States; four in Trinidad and seven in Canada). The 13 tests passed in January is about double the average of 6.8 per month last year. Likewise, the number of tests sold in January (18) is about double last year's average of 8.7 per month. The pass rate since the Pilot Test is 93%. Including the Pilot Test, the overall pass rate is 81%.

Perhaps the best measure of the strong interest in the program is the volume of test preparation items (Study Guides) sold. As of the end of January, over 450 Study Guides had been sold. To enhance preparedness to pass the test and as a convenience to those preparing to take it, a Study Guide/On-Site Power Reference Book 'bundle' is available through Ferris State University. Individual copies of the Study Guide must be purchased through Ferris State and individual copies of the Reference Book must be purchased through EGSA.

And the Certified Techs are showing off the results of their effort. 353 individual logo items (uniform patches, baseball caps, and decals), that can be used only by EGSA Certified Technicians have been sold. The logo items enable each certified tech to demonstrate that they have passed a rigorous test and have proven skills and knowledge.

The Technician Certification program is administered for EGSA by Ferris State University. Tests, test preparation materials, and logo items must be ordered through Ferris State University. Order forms and extensive information about the program will be found on the EGSA web site (*www.EGSA.org*). Questions or comments about EGSA Education programs should be directed to George Rowley, EGSA Director of Education (*G.Rowley@EGSA.org* or 561-237-5557). ■

Techs Stand Apart from the Competition with the EGSA Certified Electrical Generator Systems Technician logo

Do you or your techs use this patch? This is the patch used only by EGSA Certified Technicians. It sends a clear message that the tech and the employer are special. The tech has proven skill and knowledge through passing a rigorous test; The employer is committed to excellence and high standards. Techs who have earned the title "EGSA Certified Electrical Generator Systems Technician"—use the logo with pride!

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☐ FSU 120	☐ FSU 121		**Baseball Cap**—These distinctive EGSA blue caps with white brim stripe, button, and vents feature the EGSA Certified Electrical Generator Systems Technician logo in front. These one-size-fits all caps are made of durable high-quality cotton and feature a flex-strap to adjust the size.	☐ $20	☐ $25	
☐ FSU 122	☐ FSU 123		**Self-Adhesive Decal** (4"x6")—These heavy-duty adhesive-backed vinyl decals are made to hold up to exposure to the elements. To help resist fading and weathering, the images are printed with UV-resistant ink and we have applied an extra coating to further protect the image from fading and abrasion.	☐ $10	☐ $15	
☐ FSU 124	☐ FSU 125		**Self-Adhesive Decal** (8"x10")	☐ $20	☐ $25	

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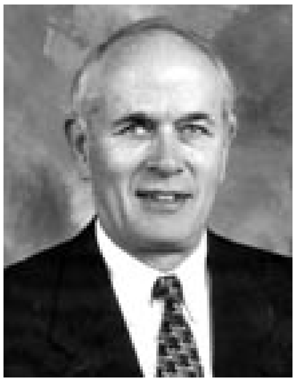

Herb Whittall
EGSA Technical Advisor

A Shortage of Trained Personnel

I often find it surprising that, despite the fact that I live in a small town, issues impacting our industry are often reported on by my local newspaper. Recently, for example, my local paper ran two articles that dealt with a problem currently facing our members: the lack of trained workers in the electrical field. The first was announcement of a "Basic Line Worker Boot Camp" run by the local Community College (IRCC) and Employ Florida Banner Center for Energy. This is a 200-hour course offered free. The second mention came in the classified section: "Three Programs Help Workers Get Into Energy" discussed the same program funded by the "Workforce Board." This is the first time I have seen anything like this in the local paper so it may mean that the utility industry needs to train electrical equipment workers and their trainees may be available for our members also.

Problems With NEC?

Don Dunavant of D Square Generators in Seattle is having trouble with changes in the National Electric Code 2008 edition. Article 702 Optional Standby Systems Section 5 Capacity and Rating was changed from "An optional standby system shall have adequate capacity and rating for the supply of all equipment intended to be operated at one time…. The user of the optional standby system shall be permitted to select the load connected to the system." to Section 702.5 (B) System Capacity. "The calculation of load on the standby source shall be made in accordance with article 220 or by another approved method." What this has done in some Authority Having jurisdiction's eyes is to remove the ability of the owner of the standby system to choose which equipment needs to be serviced by the standby systems. Now everything that might be in the circuit needs to be taken into consideration when sizing the standby system. In Don's case, houses that used to order a 5 to 10 kW standby system need to have a 30 kW system even when the water heater and system furnace are gas fired. If any of you are having the same problem we need to get a comment written to NFPA to change back to the 2005 wording. According to NFPA, the house outlets should be considered as "lighting loads" and not have a value of 180 watts per outlet. NFPA also said the panel thought the user—if he did not want his complete system on the emergency standby system and used an automatic transfer and startup of the emergency standby system—should have the loads he wanted connected brought out to a separate panel and have the emergency standby system connected to that panel. Please let me know is a problem for you; email me at *hwhittall@comcast.net*.

There is a new Article 708 in the 2008 edition of the National Electric Code. It was written at the request of the Homeland Security Department and is titled "Critical Operations Power Systems." The article's scope references NFPA codes we usually deal with—NFPA 99, 101 and 110—but it also references and has extracted text from NFPA 1600 "Standard on Disaster/Emergency Management and Business Continuity Programs." This article deals with Critical Operation Power Systems (COPS) which it defines as "power systems for facilities or parts of facilities that require continuous operation for the reasons of public safety, emergency management, national security or business continuity." The systems covered are classified such by municipal, state, federal or other codes by any governmental agency or engineering documentation showing the need for such a system. Article 708 goes into Risk Management, Identification of Hazards and Protection from Physical Damage, Testing and Commissioning. It covers the power source, wiring and means of disconnection. Interestingly, Article 708.20 (F) 6 says: "Where the COPS is supplied by a single generator, a means to connect a portable or vehicle-mounted generator shall be provided." Article 708.22 (A) states: "A portable, temporary or redundant alternative power source shall be available for use whenever the COPS power source is out of service for maintenance or repairs." Selectivity is also required in Article 708.52 (D) which says: "Ground fault protection for operation of the service and feeder disconnecting means shall be fully selective such that the feeder device, but not the service device, shall open on ground faults on the load side of the feeder device."

NFPA 99 Meets

The meeting for NFPA 99 and 110 ROP was held in January. For NFPA 99, the major issue was the rewrite of chapter 4 by ASHE. The proposal was rejected because it was not written in code language. For NFPA 110, the major issue was acceptance testing and yearly testing. New and unoccupied buildings would be tested using the normal circuit breakers and transfer switches. Occupied buildings should be tested without disrupting power to essential loads. The meeting to discuss the comments generated from the ROP will be in Chicago in late September, 2008. ■

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The Deadline for 2008 David I. Coren Scholarship Applications is May 1, 2008

Students have until May 1, 2008 to submit their applications for the David I. Coren Memorial Scholarship Awards for the 2008-2009 academic year.

Established, sponsored and administered by the Electrical Generating Systems Association (EGSA), the David I. Coren Scholarship Program provides financial assistance to qualified students and is designed to have a positive impact on personnel shortages in our industry and is an excellent vehicle for enhancing awareness of the industry.

The Association hopes to award ten $2,000 scholarships for the 2008-2009 academic year. The competitive, merit-based scholarships are awarded to qualified students who plan on pursuing a career in the On-Site Power industry. In addition to their career focus, applicants must be full-time students, have a declared major related to On-Site Power, and maintain a minimum 2.8 GPA.

EGSA launched the David I. Coren Scholarship Program in 2002 to promote awareness of the On-Site Power Generation industry and to generate interest in On-Site Power careers. The move came in response to the growing need for skilled On-Site Power personnel. While the Association has an established and widely recognized On-Site Power School education program of its own, the Board of Directors noted the industry's need for individuals with higher educations from a variety of applicable disciplines. Since its launch, the Program has distributed $86,000 to a total of 43 students.

Information detailing the David I. Coren Memorial Scholarship program—including a Scholarship Program Brochure and an Application Packet—is available at *www.egsa.org*. For additional information, individuals may contact George Rowley, EGSA Director of Education, by e-mail at *G.Rowley@EGSA.org* or by phone at 561-237-5557. ■

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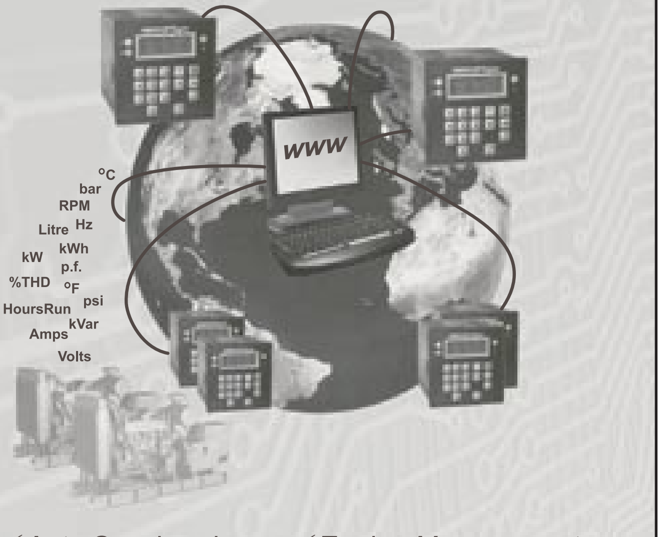

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Have You Wondered What People Download Off The EGSA Web Site?

Believe it or not, it has been a year since we have rolled out the new EGSA web site and we have been making additional improvements and implemented a new web site tracking program to allow EGSA to capture information. We are now using a 3rd-party statistics package, supplied by Google that is not dependent on the server on which the site is hosted. Positive feedback has been received from many members and we have continued to tweak the navigation and site contents based on feedback from members.

Chart 1 shows a variety of statistics reflecting the number of visitors who have visited the EGSA's Web Site and the number of pages that they have viewed and the duration of time that they spent on the web site during the 2007 year.

Chart 2 is a list of the most popular pages that have been viewed during the period of time from January to December in the descending order of importance.

While there is some month-to-month variation, the visitor statistics are remarkably steady. The variation can be explained by time-sensitive issues: upcoming conventions, release of the quarterly generator shipment report, schools and calendar announcements, etc. We are pleased by the length of time visitors are spending on the EGSA web site and the number of pages they are viewing. In fact, only about 37% of visitors are leaving after viewing only one page, and most are viewing five pages during their visit. In the old web site almost 70% of the web site visitors were leaving the web site after viewing the Home Page. People accessing the site directly (rather than through a search engine or a link from some other Web site) have increased to 53% of the time. In the old web site, people only accessed the web site directly about 30% of the time. So we can conclude that people are finding the web site information more valuable and that the new site lay out is easier for them to find their information.

In addition, we have been able to track what people typed into Google, Yahoo, etc. to find the EGSA web site (in order of popularity) in the last 12 months.

Also, we have been able to determine what the most important information was that they downloaded over the past 12 months. Chart 3 is a list of documents that were most downloaded.

Are you surprised at the information that has been downloaded by people visiting the EGSA web site? Clearly, these individuals find our information very valuable. I was especially surprised at the number of standards that have been downloaded. It has been approximately three years since we had decided to disband the standards writing groups; and only try to influence and monitor the standards affecting our industry.

Standards Writing Anyone?

If anyone is interested in updating these standards, then please contact Ron Hartzel at *RonDHartzel@eaton.com* and identify which standards you would be interested in updating. If you know of a need for a standard because nothing exists in the industry, then please identify the topic of the standard and what other EGSA members may have expertise in this area. Depending on the level of interest and the number of standards identified, we will determine what to do with the information.

New web site feature

We have just added another new feature to the web site to recognize the past contributions of our members. So often we say thanks to members and their companies at the conferences and then everyone goes back to their hectic live styles and the information is forgotten forever. We have just added the "Awards and Recognition" page under the "About EGSA" page. Check it out; you will see what awards members have received over the years and the companies that the recipients were working for at the time of receipt of the award. Also, you can read about the awards themselves and when they came into existence.

Another new feature that will be added in the near future is the ability to electronically register for conferences. In the future we will transitioning away from the paper "manual" processes to the electronic process in order to improve the quality of the information and reduce the amount of human intervention. If you have any suggestions on items that you would like to have changed or added to the web site, please contact Ron Hartzel at *RonDHartzel@eaton.com*. ■

Chart 1

Month	Visitors	New Visitors	Avg Pages per Visit	Avg Time on Site
January	3013	70.86%	5.08	3:51
February	2639	67.37%	5.07	3:37
March	2762	66.91%	5.32	4:19
April	2304	70.05%	4.90	3:34
May	2360	64.41%	4.97	5:45
June	2298	61.88%	5.56	4:02
July	2331	62.25%	4.75	3:35
August	2546	65.55%	4.59	3:15
September	2392	64.80%	5.27	4:07
October	2900	62.69%	5.00	3:30
November	2798	63.65%	4.37	3:23
December	1942	71.01%	5.05	3:52
2007 Totals	**30285**	**65.93%**	**4.99**	**3:44**

Chart 2

1. Home page
2. Buyers Guide Search
3. Certification Main Page
4. Reference Book Page
5. *Powerline* Online (Overview)
6. Industry Calendar
7. Schools Overview Page
8. How to Join EGSA
9. Job Bank
10. Fall Conference Page
11. About EGSA
12. *Powerline* Online (Current Issue page)
13. Standards Download Page
14. Contact EGSA
15. Spring Convention Page
16. Certification Exam Overview

Chart 4

Rank	Hits	Search Term
1	2971	EGSA
2	435	*Powerline* magazine
3	252	Electrical Generating Systems Association
4	194	egsa.org
5	149	www.egsa.org
6	129	electrical generation
7	82	interstate power systems
8	63	governors america corp
9	55	on-site power generation
10	51	all-power generator

Chart 3

Document	Downloads
2007 Schools Brochure ☐	1393
Reference Book Order Form ☐	734
2007 Spring Convention Flyer ☐	552
Membership Application ☐	485
All Standards (in a single zip file) ☐	346
Reference Book Chapter Listing ☐	373
Current Powerline Magazine ☐	284
CEU Learning Outcomes document ☐	218
2007 Fall Conference Brochure ☐	184
Powerline Media Kit ☐	163
Certification FAQ ☐	137
EGSA 100E-1992: *Performance Standard for Governors on Engine Generator Sets*	125
EGSA 101S-2005: *Guideline Specification for Engine Driven Generator Sets, Emergency or Standby*	123
Scholarship Application (new applicant version)	122
EGSA 100B-1997: *Performance Standard for Engine Cranking Batteries Used with Engine Generator Sets*	115
Order form for EGSA 107T-1999: *Performance Standard for Generator Test Methods*	105
EGSA 100T-1995: *Performance Standard for Diesel Fuel Systems for Engine Generator Sets with Above Ground Steel Tanks*	102
EGSA 109C-1994: *Code Listing: Safety Codes Required by States and Major Cities*	98
EGSA 100S-1996: *Performance Standard for Transfer Switches for Use with Engine Generator Sets*	89
EGSA 100M-1992: *Performance Standard for Multiple Engine Generator Set Control Systems.*	81
EGSA 101G-1998: *Glossary of Electrical and Mechanical Terminology and Definitions*	77

Emergency Power for Today's Healthcare

By James D. Ferris, PE, TLC Engineering for Architecture, Healthcare Division, Orlando, FL

An aging power grid, rolling blackouts, and natural disasters are constant reminders that healthcare facilities must be prepared to operate through more than just a few hours of power outage.

There is an even greater need for hospital services during the types of emergencies that cause power events. And it's a major challenge to the design team to determine the requirements for the emergency power system.

As in all engineering projects, it helps to break down the design into individual tasks and decisions. The tasks consist of identifying potential power problems for the hospital, determining the essential system requirements and loads to be served, designing the emergency system, and protecting the system. The capital available for these projects is limited, so for each step, the system design must be evaluated on a cost basis to identify needs versus wants.

Assessing risks

It's important to get in touch with the utility provider early in the project to determine some of these items. The utility staff can help identify the answers to some of these questions.

For example, one hospital client, located in a high-growth area, is on a grid that is expected to have the addition of two commercial supercenters, one office quad, and a high-rise residential building, all within a year. At the same time, the hospital was poised to double in size. Working with the utility, engineers were able to determine that all of these buildings would be fed from one substation. However, the utility was pulling all new dual feeds to each, and replacing the wiring to the hospital with a loop feed. Also, the hospital was given the option to expand the system, for a fee, to be fed from two substations.

What Are The Risks?

The first question is: What is the likelihood that at some point in the life of an emergency power system, a hospital will need to operate on generator power for several hours, days, or even weeks? Normal service must be evaluated for reliability and the following questions are helpful in determining the likelihood of a normal power outage:

- What is the history of power problems in the area? Typically the local utility can provide a history of what outages have occurred and the reliability of the services.
- Does the hospital have dual services, and if so, are they from separate substations?
- What else is on the grid with the hospital and how far is the hospital from the substation?
- Is the hospital located in a high-risk area for earthquakes, tornados, or hurricanes?
- Is the area prone to lightning strikes?
- How well does this particular hospital maintain its equipment?

Figure 1

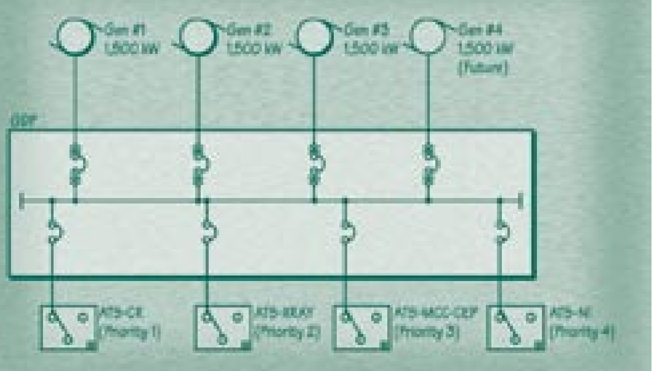

Figure 1: Normal/emergency transfer switch priority scheme.

Some of these decisions are based on the probability that a failure will occur in the normal system. Unfortunately, natural disasters also play a part. Tornados, hurricanes, floods, and lightning can have an impact on the operation of the normal service.

Hospitals also affect the reliability of the distribution system. Neglect reduces the lifespan of equipment and increases the likelihood of problems, whereas a preventive maintenance program, with regular testing of equipment and infrared testing of service gear, will help catch some of equipment issues before an operational failure occurs.

What is on emergency power?

The second task requires collective effort of the owner, operators, users, and sometimes the local authority having jurisdiction (AHJ). NFPA 517, 99, 101, and 110, the state and local codes, and the AIA Guidelines for Healthcare Facilities all provide some input on what must be connected to emergency power. This is the easy part. The question is, what other items does the owner want on emergency power? Does the facility want the complete HVAC system on emergency or just some areas? What about radiology equipment? These are not required by code, but the owner may want to use them in an extended outage. To what extent will the kitchen operate? Does the facility intend to maintain normal operation or has the owner established a plan to maintain food services during a power outage? Are administrative spaces required to be on emergency power?

There is a growing trend in the healthcare industry toward backing up the entire hospital. Often this is an owner-driven request, because there are benefits the owner receives from backing up both the normal and essential services. Many utilities have programs where hospital owners receive financial payback on their generator systems. Several of these programs are designed to get the hospital off the grid when the utility needs the additional capacity, and the hospital gets paid based on the capacity of power they remove from the grid. Hospitals may even receive some of the capital costs for the energy plant upgrades from the utility company.

Providing an emergency generation system that supplies power to the entire facility in an outage offers additional benefits for the entire system. The design still maintains a normal branch of power; in this case it could be defined as the nonessential branch.

This branch includes loads that typically would be connected to the normal branch and have their own transfer switch. These loads do not require emergency power per code. Therefore, power to these branches will be restored last. In Figure 1, these loads are represented as priority 400 loads, automatic transfer switch (ATS) N1 through N4. Also in the event that one generator is out of service, or there is insufficient power, the non-essential branch can be shed. Transfer switch schemes along with distribution designs enable the control of load priorities, including these normal loads. For example, Figure 1 shows a system where the radiology equipment is a priority 2, just a step behind the code-required priority 1 branches.

Figure 1 is an example of a normal/emergency transfer switch priority scheme using multiple transfer switches. Only four transfer switches are shown in the one line for clarity, but the figure includes all transfer switches within the system. The purpose is to break down the loads to determine what load is connected to the bus first. Priority 1 is the branch that must have power restored within 10 s, the life safety and critical branch loads as well as generator equipment loads required to be on in 10 s. The priority 2 loads will come on second, after a pre-set time delay as

Single or Multiple Gensets?

The engineer must determine if the emergency power system should be from a single generator or from multiple generators paralleled together. The pros and cons for each strategy include the following:

Single Generator

Pros	*Cons*
Cost	Single point of failure
Less space required	Future growth is limited
Simplicity	
Reduced maintenance	
Flexibility	

Multiple Generators

Pros	*Cons*
Increased generation capacity	Cost
Reliability	Space
Future growth	Fault levels
Control schemes	Limited flexibility
Tie breaker schemes	

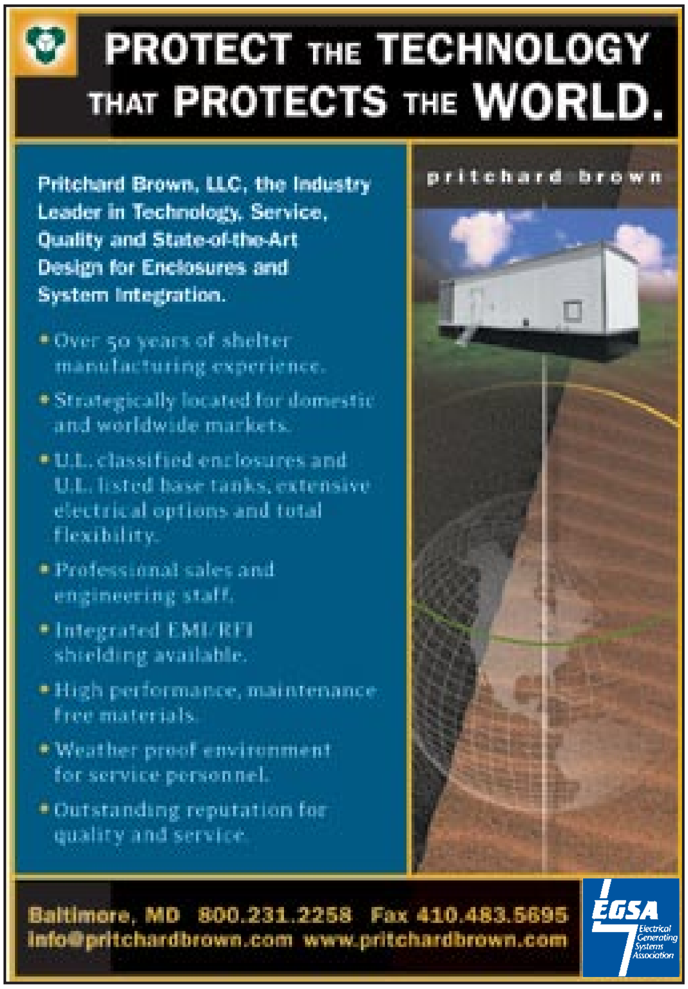
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Figure 2

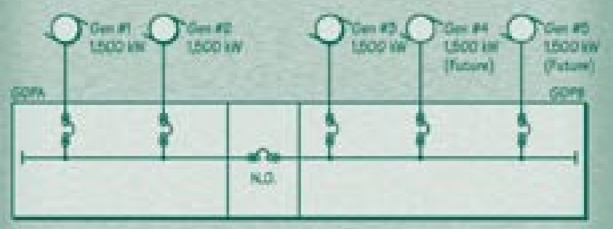

Figure 2: Synchronization of gensets with a tie breaker.

long as the second generator is running. This will repeat again for the priority 3 loads and the third generator, then again with the priority 4 loads.

At this point in the design, the emergency system is starting to take shape. We have clearly defined how long we may be without power, and what additional equipment, beyond code-required equipment, the owner would like to include in the emergency system. It is time to start the emergency system design.

Design of the emergency system

The third stage of the essential system design is to determine the emergency power source, elements required for the essential system, and fuel storage requirements. State and local AHJs have requirements. For instance, Florida requires a diesel generator with enough fuel for 64 h of operation with the generator loaded 100%. However, NFPA 99 only requires sufficient fuel to operate the emergency system for 90 min.

This also brings us back to the first question: How long can the hospital operate without normal power? An anticipated outage time of a few hours would require a limited amount of on-site generation. If the anticipated outage is a day or more, the size and scope of the emergency power system must provide emergency power for even more of the facility. Some designs use UPS systems, but this solution is limited because it requires the normal service to recharge the batteries. A fuel truck can deliver more fuel just before fuel runs out, but UPS systems are limited. A UPS system should be used for equipment that cannot tolerate interruption of service. The UPS system should be backed by the emergency generator system.

Typically, diesel generators are used for emergency systems. While you determine your loads in step 2, determine which loads are priority 1, non-shedable loads. These loads are required to have power restored in 10 s. What is the largest generator that can accomplish this? Engineers must consult with the engine manufacturers to determine the appropriate solution. The fuel source will affect the size; for instance, a 1,500-kW diesel generator

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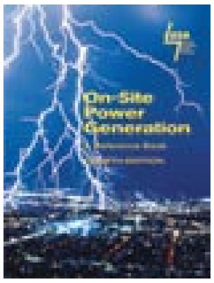

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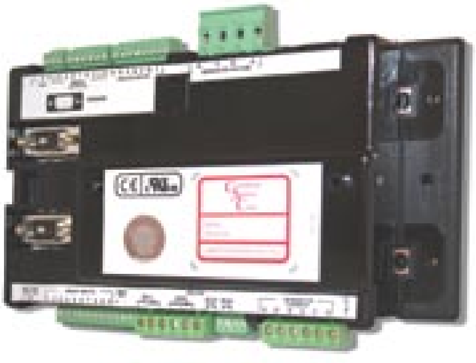

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will be able to restore power in 10 s, while a 1,500-kW propane generator may not. Sometimes the project itself will determine the number of generators needed. For example, a hospital in Florida has a parallel system with three 600-kW gensets, and space for a fourth 600-kW genset. The existing generators are operating at approximately 95% capacity, but the new loads to be added as part of an expansion are estimated at 1,000 kW. The new load is larger than the potential emergency system expansion, reducing the available options for the expansion.

The design can either include new parallel switchgear rated for five 600-kW generators and two new 600-kW generators or a stand-alone generator unit rated for 1,000 kW. The cost-effective solution will be to provide a new stand-alone generator. The existing parallel switchgear has limited flexibility because the size of the future generator and future expansions are defined when the parallel switchgear is installed. It also is limited by the bus rating, or the space in the room that an expansion section would take up, or maybe the fault rating. In this example, the original design allowed the addition of a 600-kW generator, but no greater. In order to increase this capacity, the parallel switchgear would have to be replaced.

Usually it is not as straightforward as this example, so engineers must decide which direction to use based on their judgment. More often than not, the essential load will require the use of multiple generators in a parallel system.

The parallel generator system is more reliable than a single generator system, allowing the use of multiple generators to provide emergency power. There are a few limitations to parallel generator systems, such as priority 1 loads and increased fault current levels. Priority 1 loads have to be on in 10 s, and therefore are limited in size. When an outage occurs, a signal is sent to all generators to start. The first generator to come up to full speed will be connected to the bus, then the remaining generators will sync to the first generator and connect to the bus. For priority 1 loads the first generator must be on in 10 s. The first generator on could be any of the generators, therefore the priority 1 loads are limited by the size of the smallest generator. Priority 1 loads will include life safety branch, critical branch, and some equipment branch loads such as generator equipment.

Sometimes the project itself will determine the number of generators needed, but it's not always so straightforward—engineers must use their judgment.

One can use a tie breaker in parallel switchgear designs. As shown in Figure 2, the tie breaker in the open position will allow for the "A" side generator to come up to speed and connect to the bus at the same time as the a "B" side generator. This effectively

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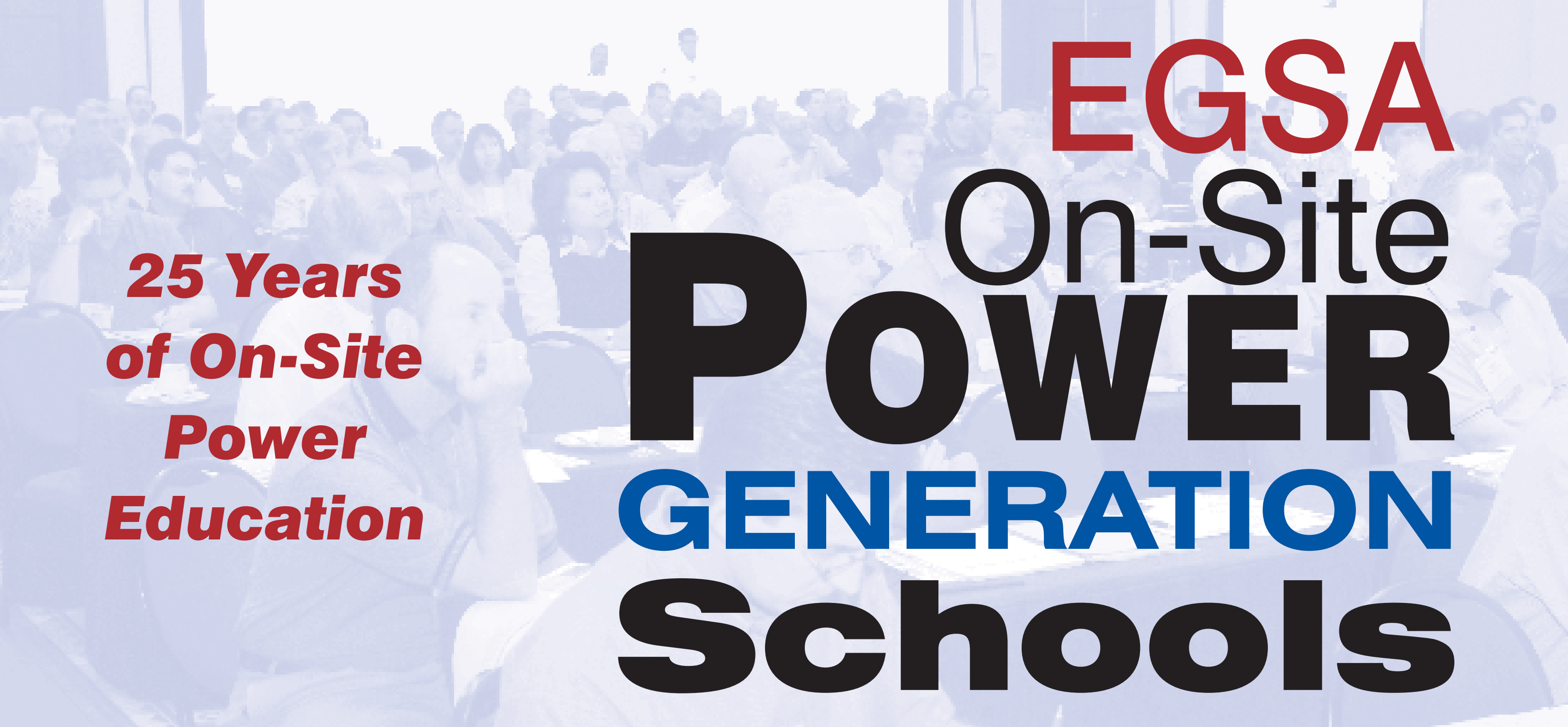

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Each registrant will receive handout materials and instruction, a copy of EGSA's *On-Site Power Generation: A Reference Book*, and lunch on each of the three days.

Advanced School

In comparison to the Basic School, the Advanced School will offer more highly technical and in-depth coverage of the equipment. The Advanced School is designed for those who have attended the EGSA Basic On-Site Power Generation School; those who are employed in Engineering, Project Management, or Service positions; and for those with over three years working in the industry.

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Figure 3

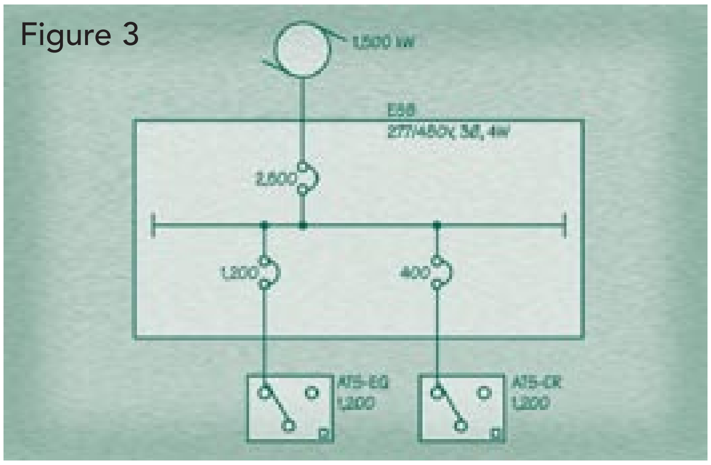

Figure 3: Panel serving two automatic transfer switches.

doubles the priority 1 load capabilities of the system because each side can be on in 10 s. Once they are on, the generators can synchronize and the tie breaker closes, creating a single bus, or the tie can remain open if design requires it.

Typically the emergency distribution system is not the primary contributor of fault current, but when multiple generators are paralleled together, the fault can exceed that of the utility service. It is important that design engineers evaluate the fault both from a normal service and an emergency service standpoint. The example shown in Figure 2 is taken from a project where the emergency side generator fault (including the estimated fault contribution from the two future generators) is approximately 90,000 amps, significantly more than what is available at the utility service entrance.

> To further clarify the performance of a generator in a fault scenario, the engineer must become familiar with the generator decrement curve.

To further clarify the performance of a generator in a fault scenario the engineer must become familiar with the generator decrement curve. The decrement curve represents the fault output of a generator and is plotted as a function of various generator characteristics including subtransient reactance–Xd" (one to five cycles), transient reactance–Xd' (five to 200 cycles), synchronous reactance Xd (above 200 cycles), subtransient time constant (Td"), transient time constant (Td'), armature short circuit time constant (Ta). The reactances are typically per unit values with the generator kVA and full load amps as the base. These values should be provided by the generator manufacturer, along with the a plot of the generator decrement curve. This document also should include the full load amperage of the generator, and the instantaneous fault output. Now that we have these values it is easy to determine what the instantaneous fault of the generator is. The equation for the instantaneous generator fault is Isc = Ea / Xd", where Ea is the internal generated voltage identified a 1.0/unit, simplifying the

Figure 4

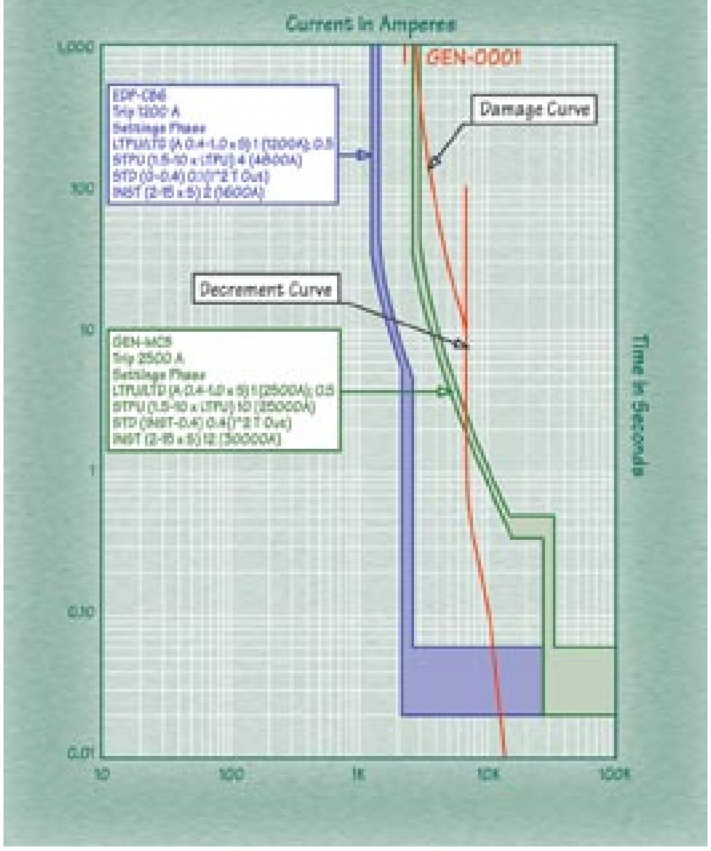

Figure 4: Time current curve showing genset decrement curve.

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formula to Isc = 1 / Xd”. We should we evaluate instantaneous available fault current within our calculations because the automatic transfer switches and electronic trip breakers we use typically only have a 3 cycle withstand rating.

After the initial fault output the generator fault output will decay rapidly. In order to maintain a fault current substantial enough to isolate the faulted breakers, permanent magnet generators are used. A permanent magnet generator will maintain 300% of the full load output of the generator for approximately 10 s. Engineers often use the full load current times three to determine the fault output of the generator. However, the fault current created by the generator will still be greater within the subtransient period. It’s important that the designer consider this when paralleling multiple generators together.

Protection of the system

NEC 2005 states that legally required standby systems’ overcurrent devices should be selectively coordinated with all supply side overcurrent protective devices. The emergency distribution system for healthcare must be designed in such a way that the system is selectively coordinated.

The goal of selective coordination is to make sure a fault or overload in one location of the system does not cause power loss at other locations in the system. An elementary example of coordination is the following. Imagine a branch circuit panel board, with a 100-amp main breaker, and a 20-amp branch circuit breaker serving lighting an operating room. A problem on the lighting circuit should trip the 20-amp branch circuit breaker before it trips the 100-amp main breaker and causes the loss of power to the remaining circuits. It is the responsibility of the designer to make sure the breakers used for the 100-amp breaker selectively coordinate with the 20-amp breaker. Normally the 100-amp and 20-amp breakers are molded-case, non-adjustable breakers. Larger breakers come with electronic trip units, which are adjustable. Here the engineer must carefully adjust the settings to achieve satisfactory coordination.

The NEC does not clearly define what must be selectively coordinate. Therefore, it is up to the engineer to work with the local AHJ to determine an interpretation of what is selective coordination and at what the requirements will be. In Florida healthcare, the local AHJ has required selective coordination plots, signed and sealed by the engineer of record, for years. The requirements for selective coordination have evolved through the years in this region and currently require selective coordination from 0.10 s on.

In order to understand the protection of the generator and the selective coordination of the generator, some basic understanding of time-current curves is required. Time-current curves are log graphs that represent the tripping time versus the current of breakers. They also are used to demonstrate the damage curve for generators, transformers, motors and wires, and to evaluate the fault contribution from a generator, or the inrush seen from a trans-

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former. To do a complete selective coordination study, all of the above items must be considered.

For a generator the two important components are the damage curve and the decrement curve. The damage curve (i.e. overload curve or withstand curve) is a measure of current from which the generator will be damaged. The decrement curve, as stated above, is a measure of the fault current produced by the generator. In the event that the generator faults, we want the breaker closest to the fault to trip and protect the system. The fault current must be sufficient to allow the breaker to trip. A standard generator cannot maintain fault current for long, so standard practice is to use a permanent magnet generator. This generator will maintain approximately 300% of the rated current for approximately 10 s, long enough for the downstream breakers to trip and protect the system. At approximately 10 s, the decrement (fault) curve will intersect with the damage curve for the generator. The selective coordination for the emergency power system must protect the generator, but allow the downstream breakers to trip.

Figure 3 shows a panel serving two ATS. Panel ESB is the parallel switchboard (only one generator is shown) that serves a transfer switch ATS-EQ via a 1,200-amp breaker. This board is fed by several 1,500-kW generators with 2,500-amp breakers protecting each. Selective coordination requires that the ATS-EQ breaker trip before the GEN breaker.

But if the fault is greater than both breakers, what will happen? We want to avoid a situation where a fault will take a generator offline before it takes the faulted branch of line. In Figure 3, we don't want a fault in ATS-EQ to take the generator offline because it will remove the power for ATS-CR. This is not selective coordination.

The goal is simple: design the protection that allows the downstream breakers to trip before the generator breaker trips. The generator breaker in Figure 4 is set to the right of the decrement curve from 0 s through 2 s, and crosses to the left of the decrement curve before damage to the engine occurs. Remember, the decrement curve is the fault output for the generator. It is important to note that many generator controllers have internal overcurrent protection that will take the generator off-line as well. Make sure you work with the manufacturer to confirm you have a complete selective coordination system.

Emergency system design is a critical first step toward the proper operation of today's healthcare facilities. Identifying the issues and addressing the challenges one at a time, we will be able to provide a safe and reliable emergency system, and do our part toward enhancing patient safety. ■

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Alberta Children's Hospital Designed for Speedy Recoveries & Power Reliability

By Robert Sheldon, Cummins Power Generation

Three 2 MW diesel generator sets from Cummins Power Generation provide standby power for Alberta Children's Hospital.

The bright, playful façade of Alberta Children's Hospital in Calgary looks like a random stack of colored building blocks—and that's how the kids who had a hand in its design wanted it to look. This colorful exterior represents the goal of the new hospital—responding to children's needs. From the state-of-the-art medical facilities that aid patients' recoveries to the standby power system that ensures their safety, the hospital's vision is to reduce stress and promote healing in ways that are uniquely tailored to the children it serves. For the 3.5 MW electrical needs of the 133-bed, 750,000-square-foot hospital, officials chose Cummins Power Generation Inc. generators and controls.

With Kids as Customers, Quality is the Bottom Line

During the early design stages of the hospital, which opened in September 2006, architects asked young patients what they thought a hospital for kids *should* look like. From these early concepts, the hospital is designed to be all about the children who go there for treatment. With a focus on family-centered care, the hospital includes sleeping facilities for parents in each patient room, a pet visitation room and healing gardens. However, most patients are treated on an outpatient basis and visit the hospital's diagnosis, assessment and treatment clinics. This clinic-based program has been used as a worldwide model for outpatient care.

Building a hospital specifically for children drove and impacted every part of the design. "Everyone on the design and construction team agreed that intangible factors—not just price—were important, because it is a children's hospital," said Gerry Stebnicki, electrical design team leader with Stebnicki + Partners in Calgary. "This made the whole approach unique. We sent a request for proposal (RFP) to generator manufacturers stating our essential performance requirements rather than a complete design; all major components of the hospital were chosen that way. We chose Cummins within that context . . . Once they were chosen, they participated in the budget control and design decisions, working in concert with the rest of the group to make it happen. That's a big reason why the project was so successful."

One example of the planning team's quality-driven focus is the high reliability designed into the standby power system. The team created N+1 redundancy at all levels. "Although we initially recommended two 2 MW generators to serve the hospital's 3.5 MW total load," said Stebnicki, "hospital officials wanted to be able to run at full load even if one generator was down — so there are three generators."

Separate Power Building Offers Benefits and Challenges

The three generators are housed in a building 400 meters (1312 feet) away from the main building. This minimizes noise and vibration in the hospital, allows ground-level access to the generators in an emergency and simplified the design of the generator cooling system.

Because of the distance between the power building and the hospital, Stebnicki chose 4,160-volt supply lines to the hospital rather than the Canadian standard of 600 volts. “Increasing the voltage allowed us to deliver the same amount of power with smaller conductors,” he said. “We saved so much on the conductor costs that the overall standby system ultimately cost less.” The 4,160-volt lines run underground and then through a series of duct banks to the main building’s penthouse. From there, power is stepped down to 347/600 volts.

The design team chose a digital master control (DMC) system that allowed complete integration with the generators and enabled them to meet interoperability requirements. There are two touch-screen control panels for the generators and transfer system, one in the generator building and another in the penthouse. They are linked by fiber-optics. “The system can be controlled from either point — and changing anything on either screen updates the other screen in real-time,” said Steve Falk of Trotter & Morton, the project’s electrical construction manager. “It is also possible to control the system through a PC from anywhere, but the design team chose not to implement that capability, partly for security reasons and partly because qualified personnel are in the hospital at all times.”

According to the hospital’s maintenance and engineering manager Dave Drinkwater, Calgary’s municipal power company, Enmax, is a highly reliable source of power. Outages are rare; in fact, there have been none since the hospital opened. ”In the rare event that Enmax needed to shed loads, we would be considered a high priority,” said Drinkwater.

System Exceeds Standards

The Canadian Standards Association’s Z-32-04 standard, ”Electrical Safety and Essential Electrical Systems in Health Care Facilities,” requires that generators be online within 12 seconds of utility outage. The digital master control (DMC) system does much better than that, according to Stenicki. “The DMC has extensive capabilities. It enables operators to monitor all major loads in the building and provides history on the profiles of all those loads, which is a very effective planning tool. When the system detects a loss of normal voltage, the UPS takes over and can, theoretically, supply power for all critical needs for hours. But the UPS doesn’t have to supply power for that long; that isn’t necessary, because as soon as there’s a power outage, the system also sends a start signal to the generators.”

Once the generators are up to speed—which takes about 10 seconds—the system again transfers power smoothly to the generators. Then the system senses when the utility comes back online, and again makes a smooth, synchronous switch back to the utility power. Fuel capacity for the generators is 50,000 liters (13,208 US gallons); depending on loading and the season, the generators could power the entire hospital for approximately 44 hours.

In a simpler system with one standby generator, the move from one power source to another would be accomplished through a transfer switch. “But since the hospital is much more complex—three generators, UPS and feeds from two utility substations—there actually are no transfer switches,” said Stebnicki. “Switching is done through the main breakers; the DMC software accomplishes seamless, synchronous switching.”

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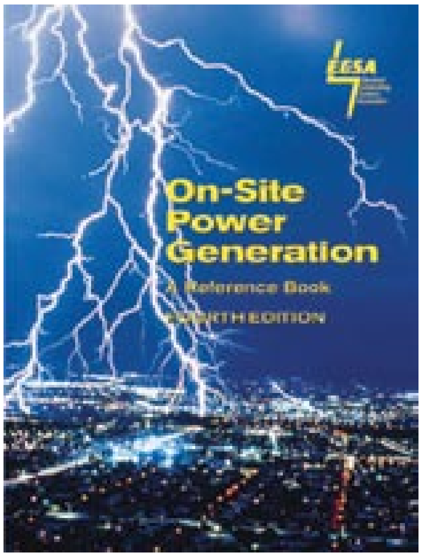

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The new hospital also exceeds other requirements of Z-32-04. For example, the standard lists critical loads that must be connected to the emergency power system. For an acute care facility such as Alberta Children’s Hospital, that list includes operating rooms, the intensive care unit, trauma care and emergency facilities, stairway lights and power outlets around every patient. The list also includes ventilation fans—in both the operating rooms and patient rooms—that determine airflow direction and therefore help to control the spread of infection. However, since just two of the three 2 MW standby generators are needed to handle the hospital’s entire load, it is unlikely that the hierarchical system will be called upon. Drinkwater’s staff tests the generators and associated equipment weekly using actual hospital loads rather than a load bank.

Inside and out, the hospital has a cheery design concept that was based, in part, on input from young patients.

Interstitial Floors for Efficient Maintenance

Another design element in Alberta Children’s Hospital that contributes to overall reliability is its interstitial floors: Every other floor is solely devoted to mechanical, electrical, telephone and plumbing equipment. Sealed, permanent conduits pass through each interstitial floor into the healthcare areas below. This contrasts greatly with the previous paradigm in which equipment was jammed into the space above a suspended ceiling. In Alberta Children’s Hospital, the interstitial floors are the same height as the healthcare floors, 14 feet, which provides more space to work in (and a floor to work *on*), so maintenance is faster and more efficient. More important, interstitial floors allow workers to “operate” on the building’s systems without interrupting or contaminating the vital healthcare activities occurring below.

With reliability and redundancy as their watch words, everyone on the Alberta Children’s Hospital design team has responded to problems with innovative solutions. But, then again, innovative solutions were the requirement, since the health—and often the lives—of children hang in the balance every day. ■

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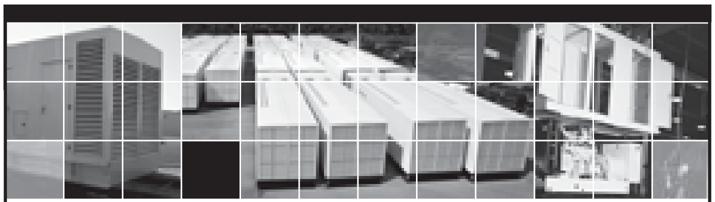

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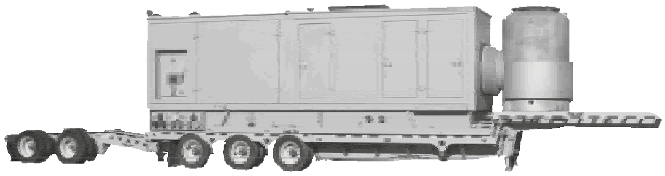

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The workshop will initially focus on propeller repairs. The second phase of development in 2009 will engender the requisite facilities for carrying out more complex engine repairs and services for marine and power plant customers. There are four skilled employees at Wärtsilä in Namibia.

Speaking at the event, the general manager for Wärtsilä in South Africa, Teppo Suominen said, "This new workshop is indicative of our ongoing commitment to our customers in southern Africa. Last year we acquired Marine Propeller (Pty) Ltd in Cape Town and in November we officially opened a new engine and propeller workshop, again in Cape Town. With the opening of our facility in Walvis Bay we can now meet the service requirements of the local industry and increase our growth potential in the Angolan offshore business, the up and coming ship repair industry and the shore-based power plant sector in the region."

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Any individual, sole proprietor, partnership or corporation actively engaged in the representation of products listed under Manufacturer Membership may apply for Full Membership as a Manufacturer's Representative. If an organization qualifies under Manufacturer Membership, it is not qualified under this section.

☐ EM **Energy Management Company Membership**
Any individual, sole proprietor, partnership or corporation engaged in energy management, including Energy Service Companies (ESCOs), Independent Power Producers (IPPs), Integrators, Aggregators, and other similar enterprises may apply for Full Membership as an Energy Management Company.

☐ **Associate Full Membership** (mark appropriate category at right)]
Any individual, sole proprietor, academic institution, student, partnership or corporation meeting the requirements of Associate Regular Membership may apply for Full Membership at their option to enjoy the privileges of Full Membership, including the rights to vote and to serve on EGSA's Board of Directors. Initiation fees and annual dues will be assessed at the existing non-manufacturers' Full Member rates.

II. ASSOCIATE REGULAR MEMBERSHIP

☐ AA **Trade Publication Membership**
Any trade publication dealing with the electrical generating systems industry or its suppliers may apply for Associate Membership—Trade Publications.

☐ AB **Trade Association Membership**
Any trade association made up of individual or company members sharing a common interest in the electrical generating systems industry may apply for Associate Membership—Allied Associations.

☐ AC **Engineer Membership**
Any consulting or specifying engineer may apply for Associate Membership—Engineer. Membership may either be held in the employer's name or individual's name under this classification. Individuals whose employer qualify as a Full Member, as described in the Full Membership section, do not qualify for this category.

☐ AD **End-User Membership**
Any individual employee of a company who owns or operates electrical generating equipment and/or related switchgear or components, whose responsibility to his employer includes planning, design, installation, supervision, or service of such equipment may apply for Associate Membership—User. Membership may either be held in the employer's name or individual's name under this classification. Individuals whose employer qualify as a Full Member, as described in the Full Membership section, do not qualify for this category.

☐ AE **Service Membership**
Any individual, organization or academic institution that offers services such as research, testing or repair to the electrical generating systems industry may apply for Associate Membership—Services. Membership may either be held in the individual's name or the organization's name under this classification. Individual companies whose employer or parent organization qualifies as a Full Member, as described in the Full Membership section, do not qualify for this category.

☐ AG **Educational Institution Membership**
Any postsecondary vocational-technical school or college offering on-site power generation-related instruction may apply for Associate Membership-Education Institution.

☐ AR **Retiree Membership**
Any individual who retires from a member company may apply for Associate Membership—Retired. This classification does not apply to any individual who is employed more than 20 hours per week.

☐ AF **Student Membership**
Any individual currently enrolled at an academic institution may apply for Associate Membership—Student.

Application for Membership – page 2

Dues Schedule (Use for Section 3)

	Annual Dues	Initiation Fee	TOTAL
Manufacturer	$825	$200	$1025
Energy Management Companies	$825	$200	$1025
Distributor/Dealer	$285	$100	$385
Contractor/Integrator	$285	$100	$385
Manufacturer's Rep	$285	$100	$385
Regular Associate Member	$200	$100	$300
Full Associate Member	$285	$100	$385
Retiree Member	$90	$0	$90
Student Member	*Complimentary*	$0	$0

NOTE: A FULL 12-MONTH DUES PAYMENT MUST BE RECEIVED WITH THIS APPLICATION. The Association's Membership Year is January 1 through December 31. Dues payments that extend beyond the first Membership Year will be applied to the second year's dues.

FULL PAYMENT MUST BE RECEIVED WITH APPLICATION.

3. Membership Dues (Please fill in the appropriate TOTAL amount from the above dues schedule.)

Membership Dues $__________

Membership Plaque (optional)** $ 39.95**

On-Site Power Reference Book (optional)** $ 125.00**

Florida Residents: Add 6.5% Sales Tax to ** items $__________

*Continental US Residents add $5 shipping/handing to**items.* $__________

*Non Continental US Residents should call EGSA Headquarters for shipping charges for **items.* **TOTAL** $__________

4. Payment Method (Payable in US$ drawn on U.S. bank, U.S. Money Order, or American Express)

☐ Check #____________ Amount $ __________

☐ Money Order

☐ Mastercard ☐ Visa ☐ American Express

Card # ________________________ Exp. Date ______

Signature: ______________________________

Print Name: ______________________________

5. Products/Services

Please describe the nature of your business (50 words or less, NOT ALL CAPS) If you are a Manufacturer's Representative or Distributor, please indicate which manufacturers you represent and/or distribute for:

____

____

____

____

____

____

Do you buy AND sell equipment? ☐ Yes ☐ No

Do you manufacture packaged equipment? ☐ Yes ☐ No

Available Codes:

01 ---Batteries/Battery Chargers
02 ---Control/Annunciator Systems
04 ---Enclosures, Generator Set
05 ---Engines, Diesel or Gas
06 ---Engines, Gas Turbine
07 ---Engine Starters/Starting Aids
08 ---Filters, Lube Oil, Fuel or Air
28 ---Fuel Cells
03 ---Fuel Tanks and Fuel Storage Systems
09 ---Generator Laminations
10 ---Generator Sets
11 ---Generators/Alternators
12 ---Governors
13 ---Heat Recovery Systems
14 ---Instruments and controls, including meters, gauges, relays, contactors, or switches
15 ---Load Banks
16 ---Motor Generator Sets
17 ---Radiator/Heat Exchangers
18 ---Relays, Protective or Synchronizing
19 ---Silencers/Exhaust Systems/Noise Abatement
20 ---Solenoids
21 ---Swtichgear and Transfer Switches (Automatic or Manual), Bypass Isolation Switches, and/or Switchgear Panels
22 ---Trailers, Generator Set
23 ---Transformers
24 ---Uninterruptible Power Supplies
25 ---Vibration Isolators
26 ---Voltage Regulators
27 ---Wiring Devices or Receptacles

Enter codes here:

Products sold: ______________

____

Products rented: ____________

____

Products serviced: ___________

____

6. Sponsor(s)

: A"Sponsor" is an EGSA Member who interested you in filling out this application. It is not mandatory that you have a sponsor for the Board to act favorably on this application; however, if a Member recommended that you consider membership, we request that individual's name and company name for our records.

Sponsor Name ______________________________Company Name ______________________________

7. Official Representative's Authorization

Signature ____Date ______________________

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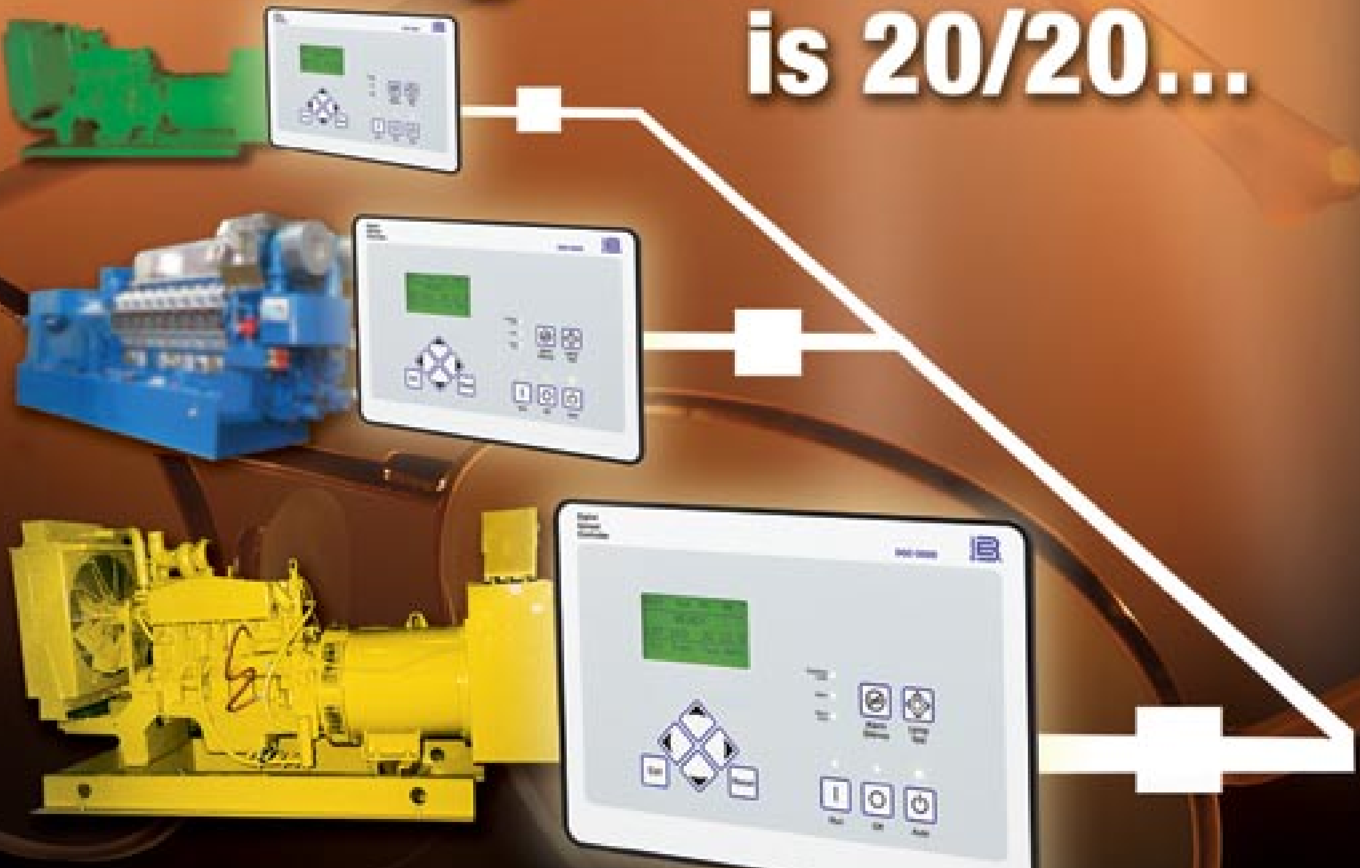

DGC-2020
Digital Genset Controller

- KW Load sharing via analog load share line
- KW Load sharing controlling an ECU
- Ethernet Communications
- Automatic Synchronizing
- Generator Sequencing
- Breaker Management

Make Load Sharing Clear with the DGC-2020

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Fax: 618.654.2351
info@basler.com

International Operations
Wasselonne France
beifrance@basler.com
Suzhou China
beichina@basler.com

Stay on Top of Your Game with EGSA's Electrical Generator Systems Technician Certification Program

Think things move pretty fast in today's business world? Think how fast they'll be moving one, five or even 10 years down the road. That's why you need every advantage to stay on top.

It's no secret that technology is becoming more complex—not less—and that makes today's On-Site Power Generation System a lot more expensive. End-users—your customers—don't want just anybody with a basic knowledge of mechanics to install and maintain their equipment. They want to be confident that all work has been performed by qualified personnel. Suppliers want assurance that skilled technicians are performing maintenance and repairs to guard against unnecessary returns or warranty repairs.

As Good as Your Word

In the past, your word was the only assurance that your technicians are skilled and knowledgeable. But now, through EGSA's Electrical Generator Systems Technician Certification Program, there is a way that you can back up those words with objective evidence of your technicians' proficiency.

EGSA CERTIFIED

ELECTRICAL GENERATOR SYSTEMS TECHNICIAN

EGSA offers you a big advantage: For the first time in our industry, we have an objective and accurate way to determine generator technician proficiency. That means that the same standards will be used to measure the skills and knowledge of technicians from Maine to Manitoba and Mexico. Yes, Manitoba and Mexico! EGSA has determined that there is no reason why the test could not be fairly applied to any NAFTA technician.

What are the Benefits?

For the Employer, certification helps ensure that your technicians have the critical knowledge and skills to succeed in their jobs. And everyone will be comfortable knowing that your certified techicians' expertise has been confirmed by *the* industry organization through a program that was developed by a university. Encouraging and helping your technicians become certified signifies your commitment to the highest of standards. Plus, it lends an added level of credibility to your firm and can sharpen your competitive edge. Employing certified techs will promote customer satisfaction and you won't have to be shy about offering assurance that your techs are qualified. Certification can also help you select potential new hires, analyze job performance, evaluate employees and motivate technicians to enhance their skills and knowledge.

Think about the message that certification sends to those with whom you do business. Why would anyone want a technician who isn't certified performing critical maintenance or repair tasks? Employing certified technicians gives you an added tool with which to market your business.

As our members have said, "We've seen too many backyard mechanics damage expensive equipment. This program will provide credibility for my company and will help build pride and a commitment from technicians to be the best."

For the Technician

Certificate holders benefit too. Certification shows employers, clients, and associates that you are committed as a professional. It provides recognition of your knowledge and skill, shows your commitment to your profession and can help with job advancement. Certification is a mark of excellence that you carry with you everywhere you go.

Acquiring certification indicates that you have the knowledge and proficiency required to perform as an Electrical Generating Systems Technician professional. Becoming certified can increase your salary, enhance your skills, and make your job more satisfying.

Certification helps ensure that your technicians have the critical knowledge and skills to succeed in their jobs.

The Certification Test

EGSA collaborated with Ferris State University to develop the certification test and program. Through a scientific process, our panel of technical experts identified 12 duty areas (such as "Basic Electricity") and 61 tasks (such as "demonstrate knowledge of AC electrical theory") within the duty areas. The duty areas and tasks were ranked and rated in terms of their relative importance, the frequency with which a task is performed, and skill level (i.e. Senior/Expert; Intermediate; and Entry Level.) All this data was combined to develop the certification test that was then statistically validated through a pilot test taken by generator technicians from across the United States.

Who can take the Test?

There are no pre-qualifications for taking the EGSA Certification test. We recommend three or four years of field experience before taking the test. Technicians who have had formal education in On-Site Power Generation (a degree or certificate from a technical school or community college) may need less field experience. Those who pass the test will have a comprehensive knowledge of basic electricity, the functions of a gen-set's mechanical and electrical components, the interactions and relationships among components and an understanding of various elements of the installation, service, maintenance, and repair of gen-sets and On-Site Power Generation Systems.

CERTIFICATION TESTING COVERS:

- *Automatic Transfer Switches*
- *Communication & Documentation*
- *Engine Generator Instrumentation & Controls*
- *Multiple Generator Switchgear & Controls*
- *Troubleshooting System Problems*
- *Auxiliary Support Systems*
- *Basic Electricity*
- *Prime Movers*
- *Governors*
- *Voltage Regulators*
- *Generators/Alternators*

Use the Study Guide to Prepare!

Use of the program's Study Guide is an excellent way to help techs prepare for the test and should clearly indicate if they are ready to take (and pass) the certification exam. In addition to useful formula pages, the guide contains almost 200 multiple choice practice questions that cover all parts of the certification test. In addition to identifying the correct answer, the guide also indicates in most cases why a particular choice is correct and why the others are incorrect. The Guide also identifies resource material where techs can get additional or more in-depth information about a given topic.

Need more information? Visit *www.egsa.org* to find extensive and detailed information about the certification program. Or contact EGSA Director of Education George Rowley via e-mail at *g.rowley@egsa.org*.

DISCLAIMER OF LIABILITY

Certified status is an indication that an individual has completed a combination of defined education, experience or examination requirements. However, Certification is not a guarantee or assurance of the competence or ability of any particular individual. Further, given the rapid changes in the field, the Electrical Generating Systems Association cannot warrant that the Examination and other Certification materials will at all times reflect the most current state of the art. The Electrical Generating Systems Association disclaims liability for any personal injury, property or other damages of any nature whatsoever, whether special, indirect, consequential or compensatory, directly or indirectly resulting from the Certification Program or the acts or omissions of any person who has been Certified by the Electrical Generating Systems Association. In conducting the Certification Program, including issuing Certifications, the Electrical Generating Systems Association is not undertaking to render professional or other services for or on behalf of any person or entity, nor is the Electrical Generating Systems Association undertaking to perform any duty owed by any person or entity to someone else. Anyone using the services of a person who has been Certified should rely on his or her own independent judgment or, as appropriate, seek the advice of a competent professional in determining the exercise of reasonable care in any given circumstances.

Electrical Generating Systems Association
1650 S. Dixie Hwy, Suite 500 • Boca Raton FL 33432
561/750-5575 • Fax: 561/395-8557 • *www.egsa.org*

Generator Field Technicians

TAW, Inc. is searching for experienced Generator Field Technicians in Pompano Beach, FL. Duties include: inspections, repairs, services and start-up of generators and ATS. Troubleshoot Generators and automatic transfer switches. E-mail resume to *ellen.donegan@tawinc.com*. Fax (813) 612-2609. AA/EOE. DFWP. Check out our web site *www.tawinc.com.*

EGSA Job Bank Guidelines—EGSA will advertise (free of charge) EGSA Members' job openings each issue in the Job Bank. Blind box ads using the EGSA Job Bank address are available upon request. Companies who are not members of EGSA may utilize the Job Bank for a $300 fee. Please note that company logos may be included for an additional fee. Please send your classified ad (limited to about 50 words) to: **EGSA Job Bank,** 1650 S. Dixie Hway, Suite 500, Boca Raton, FL 33432. Or, send it via e-mail it to: *J.Kellough@EGSA.org*

EMERGENCY POWER SYSTEM SPECIALISTS

Generator Technician—Experienced

Emergency Systems Service Company in Quakertown, PA, a leading provider of emergency generator sets, has an immediate opening for a technician with a minimum of three years diesel engine/generator set background/experience. Responsibilities will involve troubleshooting, repair and the planned maintenance services of generator sets and peripheral equipment. A neat appearance, clean driving record and good people skills are required. We offer a highly attractive compensation with an outstanding benefits package. A company vehicle and additional training provided. If you are interested in becoming part of our team, please call **(215) 536-4973, ext. 25.**

Generator Technician–Apprentice

Emergency Systems Service Company in Quakertown, PA, a leading provider of emergency generator sets, has an immediate opening for a person with a strong mechanical/electrical background interested in a career in the power generation service field. Responsibilities will involve minor troubleshooting, repair and the planned maintenance services of generator sets and peripheral equipment. A neat appearance, clean driving record and good people skills are required. An outstanding benefits package, company vehicle and additional training provided. If you are interested in becoming part of our team, please call **(215) 536-4973, ext. 25.**

Area Service Manager

Due to company expansion, TAW® is seeking an experienced Area Service Manager for our Power Systems group in Florida. We are the primary distributor for Kohler Power generators in FL and S. GA. Will provide leadership, technical assistance, and schedule and train technicians. Must possess working knowledge and avility to inspect, service and repair generator equipment. Salary and commission. E-mail resumes to *ellen.donegan@tawinc.com*. Fax (813) 612-2609. AA/EOE. DFWP. Check out our web site *www.tawinc.com.*

Salesperson Wanted

Are you looking for a strong company to build your relationship with. We are a 62 year old family business looking for aggressive self motivated generator salesperson for the Southeastern part of Virginia. Must have experience before being considered. Salary, commission, expense report, car furnished and health benefits and 401k . Will pay to relocate. Send resume to: Charles T. Gould, P.O. Box 7788, Portsmouth, VA 23707-0788; Fax: 757-673-7190; email: cgould@wbdiesel.com

Generator Set Sales/Service

Experienced sales/service engineer needed by southern California company to sell engine generator sets.
Please respond to *J.Kellough@EGSA.org*
(Reference PLND06JB-1).

POWER PRODUCTS inc.

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NEW EGSA MEMBERS

Al-Hassan, Martin. . . . .(AF)
Ottawa ON, Canada
Phone: (613) 738-9799
Contact: Martin Al-Hassan
Business: EPG Student at Fleming College

Bakery & Restaurant Equipment Repair Inc.. . . (AE Full)
Jamaica, NY
(718) 323-2705 Fax: (718) 323-2705
Contact: Jamaluddin Ally, Manager
Business: Service and maintenance of generators in the food service industry.

Barber-Nichols Inc. . . . . (AC)
Arvada, CO
(303) 421-8111 Fax: (303) 420-4679
Contact: Matthew Anderson, Marketing Associate
Business: Barber-Nichols specializes in the engineering and manufacturing of prototype heat recovery systems.

Berge's Governor Service, Inc. . . . . (DD)
Wilmington, CA
(310) 830-4592 Fax: (310) 882-5566
Contact: Larry Berge, Sales Manager
Business: Distributor for Woodward Governor Company for California and Nevada. We also distribute for Ingersoll-Rand Air Starters and Dynalco.

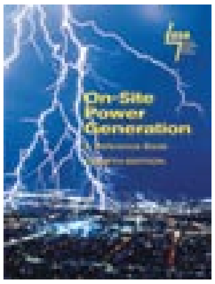
Clarke Power Services . . . . (DD)
Cincinnati, OH
(513) 771-2200 Fax: (513) 771-0520
Contact: Lewis Stuart, Manager Power Generation
Business: MTU Detroit Diesel generator sets, automatic transfer switches, switchgear, load banks, chloride UPS systems, service for all Manufacturers' equipment.

Engineered Aeroacoustics, Inc.. . . . . (MF)
New Hope, MN
(763) 535-0102 Fax: (763) 535-0131
Contact: Mark Hansen
Business: Noise Control and Aerodynamics for electrical power generation systems for both remediation and new construction. Aeroacoustic Products, Systems and Engineering services are offered individually and/or as complete, turn-key project. Noise Control/Aerodynamic services and systems are offered on a world wide basis and through an interactive web site www.eainonoise.com.

Hayhoe, Jeremy . . . .(AF)
Glen Morris ON, Canada
Phone: (519) 239-7902
Contact: Jeremy Hayhoe, Student
Business: EPG Student at Fleming College

Get The Last Word In On-Site Power

EGSA's *On-Site Power Generation: A Reference Book* is widely regarded by On-Site Power professionals as the "bible" of the On-Site Power Industry.



In fact, EGSA's *Reference Book* is so highly regarded and widely recognized that five of the seven technical schools that offer On-Site Power Generation Technician training programs have adopted the *Reference Book* as their text.

If the educators who helped train your Generator Technicians keep EGSA's *Reference Book* on hand, shouldn't you?

All the tools you need for your silencer & emission control projects...

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INNOVATIONS

Hollinger, Paul . . . .(AF)
Colborne ON, Canada
Phone: (905) 355-3668
Contact: Paul Hollinger, Student
Business: EPG Student at Fleming College

Idaho State University . . . . (AG)
Pocatello, ID
(208) 282-5814 Fax: (208) 236-6037
Contact: Kai Dixon, Diesel-Electric Instructor
Business: Vocational education institution for on-site power

Johnson Power Systems . . . . (DD)
Riverside, CA
(951) 683-5960 Fax: (951) 788-5112
Contact: Stuart Lohr, Product Support Manager
Business: We are a Caterpillar Power Systems distributor. We sell and service Caterpillar diesel and natural gas engines and generators.

Lex Products Corp. . . . . (MF)
Stamford, CT
(800) 643-4460 Fax: (203) 363-3742
Contact: Emily Piedmont, Marketing & Event Coordinator
Business: Lex Products manufactures innovative, durable, safe and long-lasting power distribution systems for generator applications. From our portable rubber distribution boxes, designed to provide maximum shock, impact and weather resistance, to our most complete line of durable, molded cable assemblies and patented switches and panels, We deliver the Power!

Merrick, Josh . . . .(AF)
Stirling ON, Canada
Phone: (613) 395-2318
Contact: Josh Merrick, Student
Business: EPG Student at Fleming College

Miles, David . . . .(AF)
Whitby ON, Canada
Phone: (905) 430-7431
Contact: David Miles, Student
Business: EPG Student at Fleming College

Power-Tronics, Inc. . . . . (MF)
Kerrville, TX
(830) 895-4700 Fax: (830) 895-4703
Contact: Paul L. Herbert, President
Business: Power-Tronics, Inc. is a manufacturer of aftermarket voltage regulating equipment for electrical generators and synchronous motors. Products are exciter regulators, static exciters, dc voltage regulators and custom made products. Other services include on-site installation supervision for larger static exciters and custom controls. Product sizes are from 5adc to 600adc.

Shapiro, Tristan . . . .(AF)
Lakefield ON, Canada
Phone: (705) 761-9183
Contact: Tristan Shapiro, Student
Business: EPG Student at Fleming College

Terex . . . . (MF)
Rock Hill SC
(803) 324-3011 Fax: (803) 366-1011
Contact: John Gibbons, Manager - Technical Sales
Business: Terex Light Construction manufactures and markets portable light towers, power generation products and concrete work tools. Terex is an American company with global sales and service network of independent dealers.

Transtec Engineering Services Ltd. . . . . (AE)
South Oropouche, Trinidad, West Indies
(868) 677-2721 Fax: (868) 677-2721
Contact: Vishnu Anthony Mungalsingh, Managing Director
Business: Transtec Engineering Services Ltd. is a general engineering service company. We repair diesel and gas engines, electric motors, generators, oil rigs, trucks, marine equipment, etc. We own a wide variety of equipment that we rent.

Trystar . . . . (MF)
Faribault, MN
(507) 333-3990 Fax: (507) 334-1683
Contact: Chris Dahl, SVP
Business: Trystar is a global leader in the manufacturing of electrical cable. Custom color and identification every foot is available for immediate same-day shipment, even on Sundays. Trystar is also a market leader in manufacturing and full assembly of all power distribution equipment. www.trystar.com

Walpole, Timothy. . . . .(AF)
Owen Sound ON, Canada
Phone: (519) 371-4206
Contact: Timothy Walpole, Student
Business: EPG Student at Fleming College

Westerbaan, Rein. . . . .(AF)
Cannington ON, Canada
Phone: (705) 432-3356
Contact: Rein Westerbaan, Student
Business: EPG student at Fleming College.

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Mobile: 416-951-4024
cfertnig@aksanorthamerica.com

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